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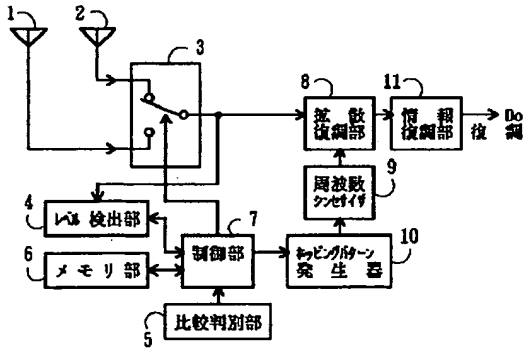
(54)【発明の名称】　スペクトラム拡散無線通信装置

(57)【要約】

【課題】　主に低速の周波数ホッピング方式によるスペクトラム拡散信号の空間ダイバーシティ受信を可能にする。

【解決手段】　前記信号を受信するスペクトラム拡散無線通信装置において、少なくとも二つの受信アンテナ１、２と、前記受信アンテナを切り換える切換回路３と、前記受信アンテナそれぞれごとに、ホッピングしてなる受信信号周波数それぞれの受信レベルを検出する受信レベル検出部４と、前記検出した受信アンテナごとの受信レベルを同じ周波数どうしで比較し、いずれの受信アンテナの受信レベルが高いかにつき判別する比較判別部５と、前記判別された受信レベルの高い受信アンテナを、ホッピングしてなる受信信号周波数ごとに対応せしめて記憶するメモリ部６と、該メモリ部の記憶データをもとに受信レベルの高い側の受信アンテナへ切換設定するように前記切換回路を制御する制御部７とを備える。



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【特許請求の範囲】

【請求項1】　周波数ホッピング方式のスペクトラム拡散信号を受信するスペクトラム拡散無線通信装置において、複数の受信アンテナと、前記複数の受信アンテナを切り換える切換回路と、前記複数の受信アンテナそれぞれごとに、ホッピングしてなる受信信号周波数それぞれの受信レベルを検出する受信レベル検出手段と、前記受信レベル検出手段で検出した受信アンテナごとの受信レベルを同じ周波数どうしで比較し、いずれの受信アンテナの受信レベルが高いかにつき判別する比較判別手段と、前記比較判別手段で判別された受信レベルの高い受信アンテナを、ホッピングしてなる受信信号周波数ごとに対応せしめて記憶するメモリ部と、前記受信レベル検出手段、比較判別手段及びメモリ部とを制御するとともに、該メモリ部の記憶データをもとに、ホッピングしてなる受信信号周波数それぞれごとに受信レベルの高い側の受信アンテナへ切換設定するように前記切換回路を制御する制御部とを備えてなることを特徴とするスペクトラム拡散無線通信装置。

【請求項2】　前記受信レベル検出手段による受信レベルの検出を、受信信号におけるデータ期間開始前のプリアンブル期間で検出するようにしたことを特徴とする請求項1記載のスペクトラム拡散無線通信装置。

【請求項3】　前記プリアンブル期間での受信レベルの検出を受信信号におけるバケットごとに行い、前記メモリ部の記憶データを更新するようにしてなることを特徴とする請求項2記載のスペクトラム拡散無線通信装置。

【請求項4】　前記制御部のもとにタイマ部を設け、前記プリアンブル期間での受信レベル検出を前記タイマ部による所定時間の計測ごとに行い、前記メモリ部の記憶データを更新するようにしてなることを特徴とする請求項2記載のスペクトラム拡散無線通信装置。

【請求項5】　前記比較判別手段が、前記複数の受信アンテナのうち最後に切換選択する受信アンテナを除いた受信アンテナそれぞれの受信レベルを前記メモリ部に一旦記憶せしめ、同記憶してなる受信レベルと前記最後に切換選択した受信アンテナのレベルそれぞれとを比較判別するようにしてなることを特徴とする請求項1記載のスペクトラム拡散無線通信装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明はスペクトラム拡散無線通信装置に係り、より詳細には、主に低速の周波数ホッピング方式によるスペクトラム拡散信号の受信に適した空間ダイバーシティ受信に関する。

【0002】

【従来の技術】ダイバーシティ受信技術は、フェーディング現象等の通信環境悪化の対処法の一つとして知られている。一方、スペクトラム拡散方式の通信分野においては、直接拡散スペクトラム拡散方式においてRAKE受信方式が知られており、また、使用もされている。なお、上記RAKE受信方式は、アンテナを切り換えるという一般的なダイバーシティとは異なり、内部動作で機能するものであって、フェーディング現象により多重通路の各々通ってきた信号を識別し、信頼度の重み付けを行って合成するもので適応等化技術を使用したものである。つまり、受信信号の干渉性の歪みを除去しダイバーシティを実現する方法である。これに対し、周波数ホッピングスペクトラム拡散方式については搬送周波数がホッピングするという原理上の特質から直接拡散方式にくらべダイバーシティの実現が一般的に困難といえる。特に、特定の周波数範囲でフェーディング現象となる周波数選択性フェーディングのもとでは単にアンテナを切り換えるだけでは上記特質から効果が低い。

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【0003】

【発明が解決しようとする課題】前述のように、周波数ホッピングスペクトラム拡散方式においては直接拡散方式にくらべダイバーシティの実現が一般的に困難といえる。本発明は上述に鑑みて、主に低速の周波数ホッピング方式によるスペクトラム拡散信号の受信に適した空間ダイバーシティを可能にしたスペクトラム拡散無線通信装置を提供することを目的とするものである。

【0004】

【課題を解決するための手段】本発明は、周波数ホッピング方式のスペクトラム拡散信号を受信するスペクトラム拡散無線通信装置において、複数の受信アンテナと、前記複数の受信アンテナを切り換える切換回路と、前記複数の受信アンテナそれぞれごとに、ホッピングしてなる受信信号周波数それぞれの受信レベルを検出する受信レベル検出手段と、前記受信レベル検出手段で検出した受信アンテナごとの受信レベルを同じ周波数どうしで比較し、いずれの受信アンテナの受信レベルが高いかにつき判別する比較判別手段と、前記比較判別手段で判別された受信レベルの高い受信アンテナを、ホッピングしてなる受信信号周波数ごとに対応せしめて記憶するメモリ部と、前記受信レベル検出手段、比較判別手段及びメモリ部とを制御するとともに、該メモリ部の記憶データをもとに、ホッピングしてなる受信信号周波数それぞれごとに受信レベルの高い側の受信アンテナへ切換設定するように前記切換回路を制御する制御部とを備えてなるスペクトラム拡散無線通信装置を提供するものである。

【0005】また、前記受信レベル検出手段による受信レベルの検出を、受信信号におけるデータ期間開始前のプリアンブル期間で検出するようにする。

【0006】また、前記プリアンブル期間での受信レベルの検出を受信信号におけるバケットごとに行い、前記メモリ部の記憶データを更新するようにする。

【0007】または、前記制御部のもとにタイマ部を設け、前記プリアンブル期間での受信レベル検出を前記タイマ部による所定時間の計測ごとに行い、前記メモリ部

の記憶データを更新するようにしてもよい。

【０００８】また、前記比較判別手段が、前記複数の受信アンテナのうち最後に切換選択する受信アンテナを除いた受信アンテナそれぞれの受信レベルを前記メモリ部に一旦記憶せしめ、同記憶してなる受信レベルと前記最後に切換選択した受信アンテナのレベルそれぞれとを比較判別するようにする。

【０００９】

【発明の実施の形態】以下、発明の実施の形態を実施例にもとづき図面を参照して説明する。図１は本発明によるスペクトラム拡散無線通信装置の一実施例を示す要部ブロック図であり、受信アンテナを２組としたものである。また、図２は図１に関する説明図である。図１において、１は第１の受信アンテナ、２は第２の受信アンテナ、３は前記アンテナを切り換える切換回路、４は受信レベルを検出する受信レベル検出部、５は受信レベルの強弱を比較判別する比較判別部、６は比較判別部５の判別結果を記憶するメモリ部、７は前記切換回路３の切換制御と、比較判別部５及びメモリ部６等の制御とをなす制御部である。また、８は周波数ホッピング方式のスペクトラム拡散信号を復調する拡散復調部、９は拡散復調部８に所要周波数発振信号を供給する周波数シンセサイザ、10は前記制御部７の制御のもとに前記周波数シンセサイザ９の発振周波数を送信側のホッピングパターンに一致させるためのホッピングパターン発生器、11は情報復調（ＱＰＳＫ等の復調）をなす情報復調部である。

【００１０】次に、本発明の動作について説明する。制御部７は２組の受信アンテナのいずれかを選択するよう切換回路３を設定する。この選択は予め定めておけばよく、本実施例では第１の受信アンテナ１を選択するものとする。第１の受信アンテナ１で受信された周波数ホッピング方式のスペクトラム拡散信号は受信レベル検出部４へ送られる。ここに周波数ホッピングのパターン１周期の周波数が、f1→f2→f3…→fnの順で変化するものとする。受信レベル検出部４は、第１の受信アンテナ１で受信された周波数f1乃至fnの信号それぞれのレベルを検出する。この検出は図２（Ａ）に示すプリアンブル期間に行うようにする。

【００１１】このプリアンブル期間は図示のように、データ期間開始前に設けられており、その目的は主に、受信側において送信側と同期をとるための期間として使用するものである。この同期がとられた後に本来のデータ期間が開始される。また、受信レベル検出部４は、上記プリアンブル期間に使用アンテナの数に等しい回数のレベル検出を行う。従って、図１の場合、アンテナを２組としているので後述の第２の受信アンテナ２を含む２回のレベル検出を行うことになり、プリアンブル期間前半で第１の受信アンテナ１につき、後半で第２の受信アンテナ２につきそれぞれレベル検出する。第１の受信アンテナ１の受信レベルデータはメモリ部６に記憶してお

く。第１の受信アンテナ１の受信レベルを検出後、制御部７は切換回路３を第２の受信アンテナ２側へ切り換え、第１の受信アンテナ１の場合と同様、周波数f1乃至fnの信号それぞれについてレベル検出する。

【００１２】第２の受信アンテナ２の受信レベルを検出開始後、制御部７は比較判別部５において、２組のアンテナの受信レベルを同じ周波数どうしでf1からfnまで比較させ、いずれの方がレベルが大きいかにつき判別させる。この比較判別は、例えば、第２の受信アンテナ２によるf1のレベルを検出後、このレベルとメモリ部６に記憶してなる前記第１の受信アンテナ１によるf1のレベルとを比較判別し、強い側のアンテナをf1と対応せしめてメモリ部６に格納する。同様の比較判別をf2からfnまで行い、各周波数と対応せしめて強い側のアンテナをメモリ部６に格納する。この結果、ホッピングパターン１周期の周波数（f1乃至fn）それぞれに対して設定（選択）する適正アンテナのデータがメモリ部６に格納される。図２（Ｂ）は上記比較判別を図示したものであり、ホッピングパターン１周期の周波数（f1乃至fn）に対し、第１の受信アンテナ１（A1）の受信レベルをE1乃至En、第２の受信アンテナ２（A2）の受信レベルをe1乃至enとし、比較判別の結果としての「設定アンテナ」がA1又はA2であることを示す。上記設定アンテナデータをメモリ部６に格納後、制御部７は同データをもとにデータ期間［図２（Ｂ）］においてホッピング周波数（f1乃至fn）ごとに切換回路３を切り換え、受信レベルの強いアンテナ側へ設定する。

【００１３】以上説明の受信レベルの比較判別を行うタイミングとして、例えば、バケットごとのプリアンブル期間に行い、メモリ部６の格納データを更新する。又は、　制御部７の下にタイマ部（図示せず）を設け、所定時間ごとに上記比較判別を行い、同様にメモリ部６の格納データを更新するようにしてもよい。切換回路３で選択された受信信号は拡散復調部８へ入力し、スペクトラム拡散復調される。この復調の際に要する所要周波数の発振信号は周波数シンセサイザ９より供給され、また、該周波数シンセサイザ９の発振周波数はホッピングパターン発生器10のホッピングパターンに従う。なお、このホッピングパターンは送信側と同パターンであり、制御部７の制御の下に作動する。拡散復調部８よりの拡散復調出力は情報復調部11へ送られ、ここで情報復調（ＱＰＳＫ等に対する復調）され、データDoの復調出力が得られる。以上のようにして、主に、低速の周波数ホッピング方式によるスペクトラム拡散信号の受信における空間ダイバーシティが可能となる。

【００１４】

【発明の効果】以上説明したように本発明によれば、周波数ホッピング方式によるスペクトラム拡散信号の受信における空間ダイバーシティが可能になる。周波数ホッピング方式は搬送周波数が変化するという特質を有する

ことから周波数選択性フェーディングの伝搬環境下ではその影響を特に受け易いが、本発明によりこの影響を低減でき、伝送品質が改善される。また、適正アンテナの確認をパケットごとに行うことにより空間ダイバーシティ受信の信頼性を安定なものにする。このように、本発明は主に低速の周波数ホッピング方式によるスペクトラム拡散信号の受信性能の向上に寄与しうるものといえる。

【図面の簡単な説明】

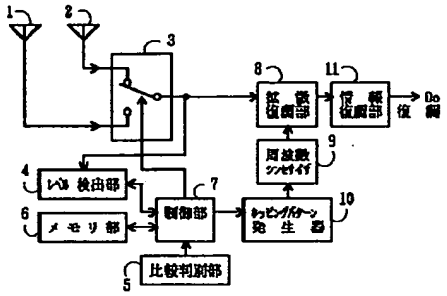
【図1】本発明によるスペクトラム拡散無線通信装置の一実施例を示す要部ブロック図である。

【図2】図1に関する説明図である。

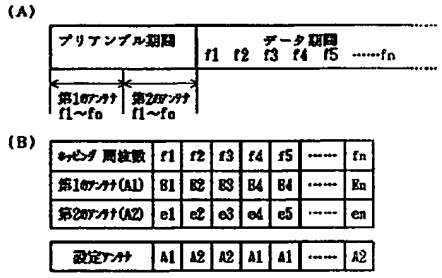
【符号の説明】

＊1　第1の受信アンテナ
2　第2の受信アンテナ
3　切換回路
4　受信レベル検出部
5　比較判別部
6　メモリ部
7　制御部
8　拡散復調部
9　周波数シンセサイザ
10　ホッピングパターン発生器
11　情報復調部

【図1】



【図2】



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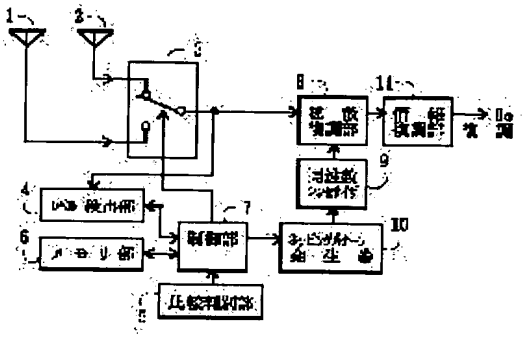
(71)Applicant : FUJITSU GENERAL LTD
(72)Inventor : FURUKAWA SHOICHI

(54) SPREAD SPECTRUM RADIO COMMUNICATION EQUIPMENT

(57)Abstract:
PROBLEM TO BE SOLVED: To realize space diversity fitted to the reception of a spread spectrum signal by a low speed frequency hopping system by switching and setting a system to the reception antenna of a high reception level for respective reception signal frequencies.
SOLUTION: The spread spectrum signal of the frequency hopping system, which is received by the first reception antenna 1, is sent to a reception level detection part 4. The respective levels of the signals of received frequencies f1-fn are detected and reception level data is stored in a memory part 6. A control part 7 changes over a switch circuit 3 to a second reception antenna 2-side and detects the levels of the signals of the frequencies f1-fn. The control part 7 compares the reception levels of two antennas by the same frequencies and stores the stronger antenna in the memory part 6 in accordance with the respective frequencies. The control part 7 changes over the switch circuit 3 for the respective hopping frequencies f1-fn and sets the system to the antenna side of the stronger reception level.



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[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1. This document has been translated by computer.So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] In the spectrum diffusion radio communication equipment which receives the spectrum diffusion signal of a frequency-hopping method The change circuit which switches two or more receiving antennas and two or more aforementioned receiving antennas, A receiving level detection means to detect the receiving level of each input-signal frequency which comes to carry out hopping for each of two or more aforementioned receiving antennas of every, A comparison distinction means to compare the receiving level for every receiving antenna detected with the aforementioned receiving level detection means with the same frequency, to take lessons from whether the receiving level of which receiving antenna is high, and to distinguish, While controlling the memory section which a receiving antenna with the high receiving level distinguished with the aforementioned comparison distinction means is made to correspond for every input-signal frequency which comes to carry out hopping, and memorizes it, and the aforementioned receiving level detection means, a comparison distinction means and the memory section The spectrum diffusion radio communication equipment which is equipped with the control section which controls the aforementioned change circuit to carry out a change setup to the receiving antenna of a side with high receiving level for each of every hopping-coming-input signal frequency based on the stored data of this memory section, and is characterized by the bird clapper.
[Claim 2] The spectrum diffusion radio communication equipment according to claim 1 characterized by detecting detection of the receiving level by the aforementioned receiving level detection means in the preamble period before the data period start in an input signal.
[Claim 3] The spectrum diffusion radio communication equipment according to claim 2 characterized by the bird clapper as performs detection of the receiving level in the aforementioned preamble period for every packet in an input signal and updates the stored data of the aforementioned memory section.
[Claim 4] The spectrum diffusion radio communication equipment according to claim 2 characterized by the bird clapper as prepares the timer section in the basis of the aforementioned control section, performs receiving level detection in the aforementioned preamble period for every measurement of the predetermined time by the aforementioned timer section and updates the stored data of the aforementioned memory section.
[Claim 5] The spectrum diffusion radio communication equipment according to claim 1 carry out a bird clapper as the feature to the receiving level which the aforementioned comparison distinction means makes the last once memorize the receiving level of each receiving antenna except the receiving antenna which carries out change selection in the aforementioned memory section among two or more aforementioned receiving antennas, and comes to memorize said, and the aforementioned last as comparison distinction is carried out in each level of the receiving antenna which carried out change selection.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to a spectrum diffusion radio communication equipment, and relates to the space diversity reception which was mainly suitable for reception of the spectrum diffusion signal by the low-speed frequency-hopping method at the detail more.
[0002]
[Description of the Prior Art] Diversity reception technology is known as one of the methods of coping with communication environmental deterioration, such as a fading phenomenon. On the other hand, in the communication field of a spectrum diffusion method, the RAKE receiving method is learned in the direct diffusion spectrum diffusion method, and use is also carried out. In addition, unlike the general diversity of switching an antenna, the above-mentioned RAKE receiving method functions by the interior action, discriminates the signal which has passed along the multipath respectively according to the fading phenomenon, and compounds by performing weighting of reliability, and adaptive equalization technology is used for it. That is, it is the method of removing distortion of the coherence of an input signal and realizing a diversity. On the other hand, generally about a frequency-hopping spectrum diffusion method, realization of a diversity can say that it is difficult compared with a direct diffusion method from the special feature on the principle that a carrier frequency carries out hopping. The above-mentioned special feature to an effect is a low only at switching an antenna under frequency-selective fading which serves as a fading phenomenon by the specific frequency range especially.
[0003]
[Problem(s) to be Solved by the Invention] As mentioned above, generally in a frequency-hopping spectrum diffusion method, realization of a diversity can say that it is difficult compared with a direct diffusion method. this invention aims at offering the spectrum diffusion radio communication equipment which made possible the space diversity which was mainly suitable for reception of the spectrum diffusion signal by the low-speed frequency-hopping method in view of ****.
[0004]
[Means for Solving the Problem] In the spectrum diffusion radio communication equipment to which this invention receives the spectrum diffusion signal of a frequency-hopping method The change circuit which switches two or more receiving antennas and two or more aforementioned receiving antennas, A receiving level detection means to detect the receiving level of each input-signal frequency which comes to carry out hopping for each of two or more aforementioned receiving antennas of every, A comparison distinction means to compare the receiving level for every receiving antenna detected with the aforementioned receiving level detection means with the same frequency, to take lessons from whether the receiving level of which receiving antenna is high, and to distinguish, While controlling the memory section which a receiving antenna with the high receiving level distinguished with the aforementioned comparison distinction means is made to correspond for every input-signal frequency which comes to carry out hopping, and memorizes it, and the aforementioned receiving level detection means, a comparison distinction means and the memory section Based on the stored data of this memory section, the spectrum diffusion radio communication equipment which comes to have the control section which controls the aforementioned change circuit to carry out a change setup to the receiving antenna of a side with high receiving level for each of every hopping-coming-input signal frequency is offered.
[0005] Moreover, detection of the receiving level by the aforementioned receiving level detection means is detected in the preamble period before the data period start in an input signal.
[0006] Moreover, detection of the receiving level in the aforementioned preamble period is performed for every packet in an input signal, and the stored data of the aforementioned memory section is updated.
[0007] Or the timer section is prepared in the basis of the aforementioned control section, receiving level detection in the aforementioned preamble period is performed for every measurement of the predetermined time by the aforementioned timer section, and you may make it update the stored data of the aforementioned memory section.
[0008] Moreover, it is made to carry out comparison distinction about each level of the receiving antenna which carried out change selection to the receiving level which the aforementioned comparison distinction means makes the last once memorize the receiving level of each receiving antenna except the receiving antenna which carries out change selection in the aforementioned memory section among two or more aforementioned receiving antennas, and comes to memorize said, and the aforementioned last.
[0009]
[Embodiments of the Invention] Hereafter, the gestalt of implementation of invention is explained with reference to a drawing based on an example. Drawing 1 is the important section block diagram showing one example of the spectrum diffusion radio communication equipment by this invention, and makes a receiving antenna 2 sets. Moreover, drawing 2 is explanatory drawing about drawing 1 . In drawing 1 , they are the change circuit where the 1st receiving antenna and 2 switch the 2nd receiving antenna, and, as for 3, 1 switches the aforementioned antenna, the receiving level detecting element to which 4 detects receiving level, the comparison distinction section which carry out [5] comparison distinction in the strength of receiving level, the memory section 6 memorizes the distinction result of the comparison distinction section 5, and the control section 7 controls change control of the aforementioned change circuit 3, and the comparison distinction section 5 and memory section 6 grade. Moreover, the hopping pattern generator for the diffusion recovery section from which 8 recovers the spectrum diffusion signal of a frequency-hopping method, the frequency synthesizer by which 9 supplies a necessary frequency oscillation signal to the

diffusion recovery section 8, and 10 making the oscillation frequency of the aforementioned frequency synthesizer 9 in agreement with the basis of control of the aforementioned control section 7 to the hopping pattern of a transmitting side, and 11 are the information recovery sections which make an information recovery (recovery of QPSK etc.).

[0010] Next, operation of this invention is explained. A control section 7 sets up the change circuit 3 so that either of 2 sets of receiving antennas may be chosen. This selection shall choose the 1st receiving antenna 1 by this example that what is necessary is just to set beforehand. The spectrum diffusion signal of the frequency-hopping method received by the 1st receiving antenna 1 is sent to the receiving level detecting element 4. The frequency of pattern 1 period of frequency hopping is f1 ->f2 ->f3 here. -- It shall change in order of ->fn. The receiving level detecting element 4 detects the frequency f1 received by the 1st receiving antenna 1, or the level of each signal of fn. It is made to perform this detection during [which is shown in drawing 2 (A)] the preamble.

[0011] This preamble period is prepared before the data period start like illustration, and the purpose is mainly used as a period for taking a transmitting side and a synchronization in a receiving side. After this synchronization is taken, an original data period is started. Moreover, the receiving level detecting element 4 performs level detection of the number of times equal to the above-mentioned preamble period in the number of used antennas. Therefore, in the case of drawing 1 , since the antenna is made into 2 sets, two level detection containing the 2nd below-mentioned receiving antenna 2 will be performed, and level detection is each carried out per 2nd receiving antenna 2 the second half per 1st receiving antenna 1 in the first half of a preamble period. The receiving level data of the 1st receiving antenna 1 are memorized in the memory section 6. After detecting the receiving level of the 1st receiving antenna 1, a control section 7 switches the change circuit 3 to the 2nd receiving-antenna 2 side, and carries out level detection about frequency f1 or each signal of fn like the case of the 1st receiving antenna 1.

[0012] A control section 7 makes the same frequency compare the receiving level of 2 sets of antennas from f1 to fn, attaches it to whether which one has large level, and makes the receiving level of the 2nd receiving antenna 2 distinguish in the comparison distinction section 5 after a detection start. This comparison distinction carries out comparison distinction of the level of f1 by the 1st receiving antenna 1 of the above which it comes to memorize in this level and the memory section 6 after detecting the level of f1 by the 2nd receiving antenna 2, makes the antenna of a strong side correspond with f1, and is stored in the memory section 6. You perform same comparison distinction from f2 to fn, you make it correspond with each frequency, and the antenna of a strong side is stored in the memory section 6. Consequently, the data of the proper antenna set up to each frequency (f1 or fn) of hopping pattern 1 period (selection) are stored in the memory section 6. Drawing 2 (B) illustrates the above-mentioned comparison distinction, E1 or En, and receiving level of the 2nd receiving antenna 2 (A2) are set to e1 or en for the receiving level of the 1st receiving antenna 1 (A1) to the frequency (f1 or fn) of hopping pattern 1 period, and it is shown that the "setting antenna" as a result of comparison distinction is A1 or A2. After storing the above-mentioned setting antenna data in the memory section 6, a control section 7 switches the change circuit 3 to every hopping frequency (f1 or fn) in a data period [drawing 2 (B)] based on these data, and sets it to an antenna side with powerful receiving level.

[0013] As timing which performs comparison distinction of the receiving level of explanation above, it carries out during the preamble for every packet, and the storing data of the memory section 6 are updated. or -- The timer section (not shown) is prepared in the bottom of a control section 7, the above-mentioned comparison distinction is performed for every predetermined time, and you may make it update the storing data of the memory section 6 similarly. The input signal chosen in the change circuit 3 is inputted into the diffusion recovery section 8, and a spectrum diffusion recovery is carried out. The oscillation signal of the necessary frequency required in the case of this recovery is supplied from a frequency synthesizer 9, and the oscillation frequency of this frequency synthesizer 9 follows the hopping pattern of the hopping pattern generator 10. In addition, this hopping pattern is a transmitting side and this pattern, and operates under control of a control section 7. The diffusion recovery output from the diffusion recovery section 8 is sent to the information recovery section 11, an information recovery (recovery to QPSK etc.) is carried out here, and the recovery output of Data Do is obtained. The space diversity in reception of the spectrum diffusion signal according to a low-speed frequency-hopping method as mentioned above mainly becomes possible.

[0014]

[Effect of the Invention] As explained above, according to this invention, the space diversity in reception of the spectrum diffusion signal by the frequency-hopping method becomes possible. Although a frequency-hopping method tends to be influenced [the] especially under the propagation environment of frequency-selective fading since it has the special feature that a carrier frequency changes, this influence can be reduced by this invention and the transmission quality is improved. Moreover, reliability of space diversity reception is made stable by checking a proper antenna for every packet. Thus, this invention can be called what can mainly contribute to improvement in the receiving performance of the spectrum diffusion signal by the low-speed frequency-hopping method.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the important section block diagram showing one example of spectrum diffusion ********** by this invention.
[Drawing 2] It is explanatory drawing about drawing 1 .
[Description of Notations]
1 1st Receiving Antenna
2 2nd Receiving Antenna
3 Change Circuit
4 Receiving Level Detecting Element
5 Comparison Distinction Section
6 Memory Section
7 Control Section
8 Diffusion Recovery Section
9 Frequency Synthesizer
10 Hopping Pattern Generator
11 Information Recovery Section

[Translation done.]